

REMARKS

Claims 1-9 and 11-12 are pending in the application.

Claim 1 stands rejected by the Examiner under 35 U.S.C. §102(b) as being anticipated by *Park et al.* (U.S. Patent 6,019,656). Claim 1 stands rejected by the Examiner under 35 U.S.C. §102(e) as being anticipated by *Imai et al.* (U.S. Patent 6,653,366). Claims 1, 2, and 4-6 stand rejected by the Examiner under 35 U.S.C. §102(e) as being anticipated by *Lee et al.* (EP 1 061 555 A1). Claims 3, 7-9, and 11-12 stand rejected by the Examiner under 35 U.S.C. §103(a) as being unpatentable over *Yaniv et al.* (U.S. Patent 6,312,303) in view of *Lee et al.* (EP 1 061 555 A1).

I. Rejections under 35 U.S.C. § 102(b)

Claim 1 stands rejected by the Examiner under 35 U.S.C. §102(b) as being anticipated by *Park et al.* (U.S. Patent 6,019,656). Applicants respectfully traverse this rejection for at least the reasons present below and request that the Examiner withdraw the rejection of claim 1.

A claim is anticipated only if every element as set forth in the claim is found in a single prior art reference. MPEP § 2131. There must be no difference between the claimed invention and the reference disclosure, as viewed by a person of ordinary skill in the field of the invention. *Scripps Clinic & Research Foundation v. Genentech, Inc.*, 927 F.2d 1565, 1576 (Fed. Cir. 1991). Furthermore, an applicant is entitled to be his or her own lexicographer and may rebut the presumption that claim terms are to be given their ordinary and customary meaning by clearly setting forth a definition of the term that is different from its ordinary and customary meaning(s). MPEP §2111. Where an explicit definition is provided by the applicant for a term, that definition will control interpretation of the term as it is used in the claim. *Toro Co. v. White Consolidated Industries Inc.*, 199 F.3d 1295, 1301, 53 USPQ2d 1065, 1069 (Fed. Cir. 1999). The Detailed Description of the specification recites: "Embossing may utilize a metal die and counter along with heat and pressure to

reshape the surface of a material (paper, plastic, metal, wood, etc.). This is sometimes referred to as 'stamping,' but a roller can also emboss an image in a surface."

Regarding claim 1, the Examiner states "*Park* discloses an apparatus comprising a substrate (11) with holes embossed therein, and carbon nanotubes (13) deposited in the holes (Fig. 1a-1C)." See Office Action from 05/03/2005, p.2, lines 21-22. For the term "embossed", the Examiner uses footnote 1 to apply the meaning "To raise in relief from a surface." See Office Action from 05/03/2005, p.2, line 22. This meaning of "embossed" is used to interpret claim 1 and justify the rejection. Applicants respectfully traverse. *Park et al.* do not disclose the embossing of holes in a substrate. *Park et al.* teach "a micro-array structure of holes is fabricated by forming a micro-sized holes on the silicon substrate by an etching process." *Park et al.*, col. 2, lines 12-15. An etching process is commonly known by one of ordinary skill in the art to mean removal of material using a process based on a chemical reaction. The Applicants' definition of embossing clearly refers to a mechanical alteration using heat and pressure. The distinction in the process used to manufacture the apparatus in claim 1 is significant inasmuch as mechanical embossing can be practiced on a wider range of substrate materials and allows more flexibility and precision in the geometry of the hole and the pitch of the pattern. Applicants respectfully assert that the device disclosed by *Park et al.* is patentably distinct from "a substrate with holes embossed therein with a die" as in claim 1. Applicants respectfully assert that the Examiner has not established a *prima facie* case that claim 1 is anticipated since *Park et al.* do not disclose or suggest every limitation of claim 1. Therefore, claim 1 is patentable over *Park et al.* Applicants respectfully assert that the Examiner withdraw the rejection of claim 1 and allow this claim for issue.

I. Rejections under 35 U.S.C. § 102(e)

Claim 1 stands rejected by the Examiner under 35 U.S.C. §102(e) as being anticipated by *Imai et al.* (U.S. Patent 6,653,366). Claims 1, 2, and 4-6 stand rejected by the Examiner under 35 U.S.C. §102(e) as being anticipated by *Lee et al.* (EP 1 061 555 A1).

A claim is anticipated only if every element as set forth in the claim is found in a single prior art reference. MPEP § 2131. There must be no difference between the claimed invention and the reference disclosure, as viewed by a person of ordinary skill in the field of the invention. *Scripps Clinic & Research Foundation v. Genentech, Inc.*, 927 F.2d 1565, 1576 (Fed. Cir. 1991). Furthermore, an applicant is entitled to be his or her own lexicographer and may rebut the presumption that claim terms are to be given their ordinary and customary meaning by clearly setting forth a definition of the term that is different from its ordinary and customary meaning(s). MPEP §2111 Where an explicit definition is provided by the applicant for a term, that definition will control interpretation of the term as it is used in the claim. *Toro Co. v. White Consolidated Industries Inc.*, 199 F.3d 1295, 1301, 53 USPQ2d 1065, 1069 (Fed. Cir. 1999). The Detailed Description of the specification recites: "Embossing may utilize a metal die and counter along with heat and pressure to reshape the surface of a material (paper, plastic, metal, wood, etc.). This is sometimes referred to as "stamping," but a roller can also emboss an image in a surface."

Regarding claim 1, the Examiner states "*Imai* discloses an apparatus comprising a substrate (11) with holes (12) embossed therein, and carbon nanotubes (13) deposited in the holes (Fig. 3A)." See Office Action from 05/03/2005, p.2, lines 21-22. For the term "embossed", the Examiner uses footnote 1 to apply the meaning "To raise in relief from a surface." See Office Action from 05/03/2005, p.2, line 22. This meaning of "embossed" is used to interpret claim 1 and justify the rejection. Applicants respectfully traverse. *Imai et al.* do not disclose the embossing of holes in a substrate. *Imai et al.* teach "applying a resist and forming a pattern in accordance with the layout of the electron-emitting portions 103 by lithography." *Imai et al.*, col. 1, line 66 to col. 2 line 1. A

lithography process is commonly known by one of ordinary skill in the art to mean removal of material using an etching process based on a chemical reaction. The Applicants' definition of embossed clearly refers to a mechanical alteration using heat and pressure. The distinction in the process used to manufacture the apparatus in claim 1 is significant inasmuch as mechanical embossing can be practiced on a wider range of substrate materials and allows more flexibility and precision in the geometry of the hole and the pitch of the pattern.

Further in regard to claim 1, *Imai et al.* do not teach depositing only carbon nanotubes directly in the holes. *Imai et al.* disclose the use of carbon ink with an organic binder and a solvent, in which the carbon particles are selected from at least one of carbon nanotubes, graphite, and carbon fibers made into carbon powder. *Imai et al.*, col. 18, claims 1 and 3. *Imai et al.* teach that the carbon nanotubes are pulverized and used for the carbon particles in the carbon ink. *Imai et al.*, col. 10, lines 32-33. In their detailed description of Fig. 3A, *Imai et al.* disclose filling the concave portions (12) with carbon ink (13). *Imai et al.*, col. 12, line 64 to col. 13 line 3. Applicants respectfully assert that the device disclosed by *Imai et al.* is patentably distinct from "a substrate with holes embossed therein with a die; and carbon nanotubes deposited in the empty embossed holes." as in amended claim 1. Applicants respectfully assert that the Examiner has not established a *prima facie* case that claim 1 is anticipated since *Imai et al.* do not disclose or suggest every limitation of claim 1. Therefore, claim 1 is patentable over *Imai et al.* Applicants respectfully assert that the Examiner withdraw the rejection of claim 1 and allow this claim for issue.

Regarding claim 1, the Examiner states "*Lee* discloses an apparatus comprising a substrate (300) with holes embossed therein, and carbon nanotubes (500) deposited in the holes (Fig. 1)." *See* Office Action from 05/03/2005, p.3, lines 14-15. For the term "embossed", the Examiner uses footnote 1 to apply the meaning "To raise in relief from a surface." *See* Office Action from 05/03/2005, p.2, line 22. This meaning of "embossed" is used to interpret claim 1 and justify the rejection. Applicants respectfully traverse. *Lee et al.* do not disclose the embossing of holes in a substrate. *Lee et al.* teach "the insulation film is patterned by photolithography thereby forming the

insulation film pattern 300" *Lee et al.*, ¶[0025]. A lithography process is commonly known by one of ordinary skill in the art to mean removal of material using an etching process based on a chemical reaction. The Applicants' definition of embossed clearly refers to a mechanical alteration using heat and pressure. The distinction in the process used to manufacture the apparatus in claim 1 is significant inasmuch as mechanical embossing can be practiced on a wider range of substrate materials and allows more flexibility and precision in the geometry of the hole and the pitch of the pattern.

Further in regard to claim 1, *Lee et al.* do not teach depositing carbon nanotubes directly in the holes without intermediate steps. *Lee et al.* disclose filling the holes 300 with a conductive polymer film thus forming the conductive polymer film pattern 400. *Lee et al.*, ¶[0025]. Thereafter *Lee et al.* teach that carbon nanotubes are sunken into the conductive polymer film pattern 400. *Lee et al.*, ¶[0029]. One of ordinary skill in the art would appreciate that the process of sinking carbon nanotubes into a hole already filled with a polymer film will yield a different product than the process of depositing carbon nanotubes directly into an empty hole. One of ordinary skill in the art would appreciate that the arrangement of carbon nanotubes in the final product would be different, for at least the reason that in the method of *Lee et al.*, the viscosity and surface tension of the polymer film represent molecular forces that would oppose insertion of the carbon nanotubes in the holes. Applicants respectfully assert that the device disclosed by *Lee et al.* is patentably distinct from "a substrate with holes embossed therein with a die; and carbon nanotubes deposited in the empty embossed holes." as in amended claim 1. Applicants respectfully assert that the Examiner has not established a *prima facie* case that claim 1 is anticipated since *Lee et al.* do not disclose or suggest every limitation of claim 1. Therefore, claim 1 is patentable over *Lee et al.* Applicants respectfully assert that the Examiner withdraw the rejection of claim 1 and allow this claim for issue.

Claim 2 depends from claim 1. Claims 4-6 depend directly or indirectly from claim 2. For at least the reasons discussed above with respect to claim 1, claims 2 and 4-6 are patentable over *Lee et al.* Applicants respectfully assert that the Examiner withdraw the rejection of claims 2 and 4-6 and allow these claims for issue.

### III. Rejections under 35 U.S.C. § 103(a)

Claims 3 and 7-12 stand rejected by the Examiner under 35 U.S.C. §103(a) as being unpatentable over *Yaniv et al.* (U.S. Patent 6,312,303) in view of *Lee et al.* (EP 1 061 555 A1).

The basic test for nonobvious subject matter is whether the differences between the subject matter and the prior art are such that the claimed subject matter as a whole would not have been obvious to a person having ordinary skill in the art to which the subject matter pertains. MPEP §2141.

Regarding claims 7, the Examiner admits that *Yaniv et al.* do not disclose "the display device comprising a substrate with holes embossed therein, and carbon nanotubes deposited in the holes." See Office Action from 05/05/2005, p.4, lines 9-10. The Examiner cites *Lee, Jr. et al.* as teaching "a display device comprising a substrate (300) with holes embossed therein, and carbon nanotubes (500) deposited in the holes (Fig. 1)" See Office Action from 05/03/2005, p.4, lines 15-17. Applicants respectfully traverse. *Lee et al.* do not disclose a data processing system with a display device according to the limitations of claim 7. *Lee et al.* teach of a white light source which "can be used as a general illumination system, and if it is extremely miniaturized, it can be used as a portable one." *Lee et al.*, ¶[0021]

For the term "embossed", the Examiner uses footnote 1 to apply the meaning "To raise in relief from a surface." See Office Action from 05/03/2005, p.2, line 22. This meaning of "embossed" is used to interpret claim 7 and justify the rejection. Applicants respectfully traverse. *Lee et al.* do not disclose the embossing of holes in a substrate. *Lee et al.* teach "the insulation film is patterned by photolithography thereby forming the insulation film pattern 300" *Lee et al.*, ¶[0025]. A lithography process is commonly known by one of ordinary skill in the art to mean removal of material using an etching process based on a chemical reaction. The Applicants' definition of embossed clearly refers to a mechanical alteration using heat and pressure. The distinction in the process used to manufacture

the apparatus in claim 7 is significant inasmuch as mechanical embossing can be practiced on a wider range of substrate materials and allows more flexibility and precision in the geometry of the hole and the pitch of the pattern.

Further in regard to claim 7, *Lee et al.* do not teach depositing carbon nanotubes directly in the holes without intermediate steps. *Lee et al.* disclose filling the holes 300 with a conductive polymer film thus forming the conductive polymer film pattern 400. *Lee et al.*, ¶[0025]. Thereafter *Lee et al.* teach that carbon nanotubes are sunken into the conductive polymer film pattern 400. *Lee et al.*, ¶[0029]. One of ordinary skill in the art would appreciate that the process of sinking carbon nanotubes into a hole already filled with a polymer film will yield a different product than the process of depositing carbon nanotubes directly into an empty hole. One of ordinary skill in the art would appreciate that the arrangement of carbon nanotubes in the final product would be different, for at least the reason that in the method of *Lee et al.*, the viscosity and surface tension of the polymer film represent molecular forces that would oppose insertion of the carbon nanotubes in the holes. Applicants respectfully assert that the device disclosed by *Lee et al.* is patentably distinct from "a substrate with holes embossed therein with a die; and carbon nanotubes deposited in the empty embossed holes." as in amended claim 7. Applicant respectfully asserts that the Examiner has not established a *prima facie* case of obviousness for claim 7 since the differences in the Applicant's subject matter and the prior art reference are substantial to one of ordinary skill in the art. Furthermore, the Examiner has not presented a *prima facie* case of obviousness in rejecting claim 7, since the Examiner is relying upon an incorrect, factual predicate in support of the rejection. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1455 (Fed. Cir. 1998). Therefore, claim 7 are patentable over *Yaniv et al.* in view of *Lee et al.* Applicant respectfully asserts that the Examiner withdraw the rejection of claim 7 and allow this claim for issue.

Regarding claims 8-9 and 11-12, the Examiner admits that *Yaniv et al.* do not disclose "the display device comprising a substrate with holes embossed therein, and carbon nanotubes deposited in the holes." See Office Action from 05/05/2005, p.4, lines 9-10. The Examiner cites *Lee, Jr. et al.* as

teaching "a display device comprising a substrate (300) with holes embossed therein, and carbon nanotubes (500) deposited in the holes (Fig. 1)" See Office Action from 05/03/2005, p.4, lines 15-17.

Applicants respectfully traverse. *Lee et al.* do not disclose a data processing system with a display device according to the limitations of claim 7. *Lee et al.* teach of a white light source which "can be used as a general illumination system, and if it is extremely miniaturized, it can be used as a portable one." *Lee et al.*, ¶[0021] Claim 8 depends from claim 7; claim 9 depends from claim 8; claim 11 depends from claim 9; and claim 12 depends from claim 11. Claims 8-9 and 11-12 thus depend directly or indirectly from claim 7. For at least the reasons discussed above with respect to claim 7, claims 8-9 and 11-12 and 4-6 are patentable over *Yaniv et al.* in view of *Lee et al.* Applicants respectfully assert that the Examiner withdraw the rejection of claims 8-9 and 11-12 and allow these claims for issue.



IV. CONCLUSION

As a result of the foregoing, it is respectfully asserted by Applicant that claims 1-9 and 11-12 in the Application are in condition for allowance, and Applicant requests an allowance of such claims. Applicant requests that the Examiner call Applicant's attorney at the below listed number if the Examiner believes that such a discussion would be helpful in resolving any remaining issues.

Respectfully submitted,

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12179-P100D1 6/21/2005